

***United States Court of Appeals
for the Second Circuit***



**BRIEF FOR
APPELLANT**

74-1050

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FOR THE SECOND CIRCUIT

THE GENERAL TIRE & RUBBER COMPANY,

Plaintiff-Appellant,

v.

JEFFERSON CHEMICAL COMPANY, INC.,

Defendant-Appellee.

On Appeal from a Judgment of the United States District
Court for the Southern District of New York

BRIEF FOR PLAINTIFF-APPELLANT

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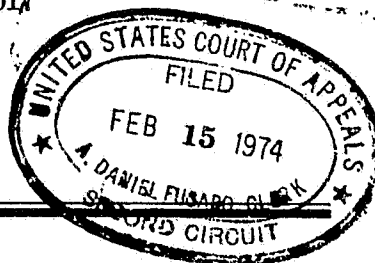


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BRIEF FOR PLAINTIFF-APPELLANT

Preliminary Statement

This is an appeal by plaintiff-appellant, The General Tire & Rubber Company (hereinafter "General") from a judgment (34a)¹ entered on November 9, 1973 in the United States District Court for the Southern District of New York dismissing General's declaratory judgment complaint. The Court held claims 3, 4, 5, 6, 8, 9, 10 and 11 of the Heiss Patent No. 3,102,875 valid and infringed and ordered an injunction and an accounting in favor of defendant. The opinion of Hon. Robert L. Carter (14a), which constitutes the Court's Findings of Fact and Conclusions of Law, is reported at 363 F. Supp. 871 (S.D.N.Y. 1973).

¹ Refers to page numbers of Joint Appendix. "Px" refers to plaintiff's exhibits. "Dx" refers to defendant's exhibits.

General is an Ohio corporation engaged, *inter alia*, in manufacturing and selling flexible polyurethane foam products. Defendant, Jefferson Chemical Company, Inc. (hereinafter "Jefferson") is a Delaware corporation wholly owned by Texaco, Inc. and American Cyanamid Company (206a), has its principal place of business in Houston, Texas and maintains an office in New York City.

The complaint sought a declaratory judgment holding U. S. Letters Patent No. 3,102,875 issued to Herbert L. Heiss (hereinafter the "Heiss patent") invalid and unenforceable. Defendant counterclaimed for infringement of the Heiss patent. Jurisdiction exists under the Patent Laws, and under Title 28 U.S.C. Sections 1338, 1391(c) and 1400(b).

The Heiss patent purports to involve polyurethane products made by the following method:

An alcohol product (referred to as a "polyol") is mixed with another compound (known as an "isocyanate"). The two react chemically and the result is polyurethane. Polyurethanes are made into a wide variety of products including foam mattresses, seat cushions and insulation.

The District Court found that the Heiss claims, "differed" from the prior art in their use of a particular alkylene oxide—namely propylene oxide—to make the polyol used in making the polyurethane.

General has admitted that if the patent is valid, it has infringed claims 3-6 and 8-11. Thus, the issue in this case is the validity of the Heiss patent.

This Court should be aware that the outcome of this case has implications which extend far beyond its impact on the litigants. Since the Heiss claims literally cover an annual production of a billion pounds of foam products in the United States amounting to one-half billion dollars in sales (25a) and since products other than foam, such as polyurethane adhesives, protective coatings and electrical

insulating components are also covered, many areas of American industry, and particularly a major segment of the polyurethane industry, will be subject to a royalty if validity of the patent is sustained. Careful evaluation of each defense to the patent is therefore in the public interest.

Issues Presented for Review

1. Was it an error of law for the District Court to base patentability on unexpected properties of the claimed product when the patent fails to disclose those properties?
2. Did the District Court err under 35 U.S.C. § 102(e) by failing to give effect to the plain meaning of the teaching in the Windemuth patent to use "alkylene oxides" which the evidence shows is an implicit teaching to use propylene oxide?
3. Did the District Court err under 35 U.S.C. § 103 in failing to find that, in making polyurethane products, the use of propylene oxide would have been an obvious choice to a chemist from Windemuth's teaching to use "alkylene oxides"?
4. Did the District Court err in failing to combine the teachings of the Bayer article and the Hill patent, a combination within the level of ordinary skill of the art, which renders the Heiss claims obvious and invalid under 35 U.S.C. § 103?
5. Is the oral testimony and documentary evidence in this case sufficient to satisfy the burden of proof that Dr. Charles C. Price made the invention in 1949 thereby rendering the Heiss patent invalid under 35 U.S.C. § 102(g)?
6. Did the District Court err in failing to find that the Heiss patent is invalid under 35 U.S.C. § 112 in that Heiss did not distinctly claim the subject matter regarded by him to be his invention because the claims omit what he considered to be an essential component—the plasticizer?

Statement of the Case

Heiss Patent No. 3,102,875, issued to Monsanto Chemical Company and Mobay Chemical Company September 3, 1963 on an application filed August 7, 1953. Later Monsanto assigned its share of the patent to Mobay and Mobay then assigned the patent to Jefferson.

The subject matter described in the application, as filed, was the joint invention of Herbert L. Heiss and Dr. James H. Saunders.² For the convenience of the Court, a brief summary of the background chemistry describing polyurethane products, how they are made and the meaning of various chemical terms, is included at the end of this brief.

Three principal components are used in making the invention according to the Heiss specification.

As one component, the *polyol*, the specification enumerates a multitude of hydroxy compounds including various glycols (diols), triols, tetrols, polyether polyols and polyester polyols (Px 1, 501a, col. 1, l. 58-col. 2, l. 32). All are treated as equally suitable. *None is disclosed to be superior to any other* (63a).

Another component, the *isocyanate*, is described at column 2, line 44 to column 3, line 9 (501a-502a).

The third component is an *organic liquid*, referred to as a "plasticizer," which is described at column 4, lines 1-28 (502a).

The patent specification divides the invention into two general classifications—bubble free resins and cellular resinous foams (Px 1, 502a, col. 3, ls. 56-59, 69a). Examples I through XXI of the patent illustrate the bubble free resins. Examples XXII through XXV illustrate foam, which was Saunders' idea. In *every* example, a major component

² In 1959, Dr. Saunders' name was removed from the application (Px 2, 649a). His contribution was in making a foam with a catalyst (Px 28, 816a).

is the organic liquid plasticizer (e.g., chlorinated biphenyl) (70a, 81a).

From the filing date in 1953 to 1958, the Patent Office repeatedly rejected all claims of the application over the prior art. In response, the applicants repeatedly argued and insisted that the essential feature of their invention which distinguished the claims over the prior art was the *plasticizer* (See Point V).

Then, on December 30, 1958, an important event occurred that was destined to change the direction of the Heiss patent application. On that date U. S. Patent No. 2,866,774 (Dx A, 840a) issued to Dr. Charles C. Price. The claims of the Price patent were specifically limited to the reaction products of propylene oxide condensates (having a molecular weight in excess of 600) and isocyanates. Prior to issuance of the Price patent, the Heiss application never had any claim specifically limited to propylene oxide condensates.

On February 6, 1959, Heiss' attorney introduced claims into the Heiss application which were copied from the Price patent, including the molecular weight limitation set forth therein, and requested that an interference be declared to determine who was the first to invent the subject matter defined by the copied claims (Px 2, 600a-611a).³ *This was the first time* that claims directed to the use of propylene oxide condensates appeared in the Heiss application.

An interference was declared on July 21, 1959 and proceedings followed (629a). On March 23, 1962, the Board of Patent Interferences awarded priority of invention to Dr. Price. The Board held that the molecular weight limitation specified in the Price claims was a critical feature of the invention which the Heiss application did not disclose (Px 27, 802a-815a).

³ An interference is a proceeding in the Patent Office to determine priority of inventorship, 35 U.S.C. § 135.

After losing priority to Price, the Heiss application was returned to the Patent Examiner for resumption of *ex parte* prosecution of claims without the molecular weight limitation. On August 13, 1962, citing Windemuth et al. Patent No. 2,948,691 (hereinafter, "Windemuth") as prior art⁴ for the first time, the Patent Office (Px 2, 658a) rejected the Heiss claims which called for use of alkylene oxide condensates in the reaction. On September 26, 1962, Heiss' attorney responded by cancelling the rejected alkylene oxide claims and submitting claims limited specifically to propylene oxide. Propylene oxide is one of the two most prominent alkylene oxides. Notwithstanding, Heiss' attorney argued that the propylene oxide claims were patentable over Windemuth, stating (Px 2, 665a):

" . . . All of the claims [of Heiss] require that the alkylene oxide be propylene oxide. Windemuth et al. discloses *only* ethylene oxide." (Emphasis added)

The Examiner allowed the revised claims on October 12, 1962 (Px 2, 668a).

The Heiss patent eventually issued on September 3, 1963. Claim 3 of the Heiss patent, which both parties regard as representative of the claims in issue, reads:

"3. The reaction product of

(1) a condensate of propylene oxide and a polyhydric alcohol having from 3 to 4 hydroxyl groups, and

(2) an organic polyisocyanate,

the amount of (2) being in excess of that theoretically required to react with the reactive hydrogens of said condensate."

⁴ Other relevant prior art not cited by the Patent Office includes Sokol Patent No. 2,527,970, Hill Patent No. 2,726,219 and a 1947 publication by Dr. Otto Bayer. These are discussed in Points II and III.

Summary of Argument

The Heiss patent is invalid for each of several independent reasons.

1. The District Court erred in its reliance on "unexpected properties" as a basis for infusing patentability into the Heiss claims. "Unexpected properties" are irrelevant to the issue of patentability in this case because the Heiss patent contains no disclosure of such properties. (See Point I).

2. The claimed invention is fully anticipated by the Windemuth patent under 35 U.S.C. § 102(e). The evidence is conclusive that *propylene oxide* is as explicitly taught in Windemuth by the teaching to use *alkylene oxides* as if propylene oxide were specifically named. (See Point II).

3. The Heiss patent is invalid under 35 U.S.C. § 103 because it was obvious to one skilled in the art. If use of propylene oxide was not completely anticipated by Windemuth under 35 U.S.C. § 102, its use would certainly have been obvious to a chemist. When a prior art patent instructs one to use an alkylene oxide, it does not take invention to use propylene oxide, particularly when propylene oxide was one of the two most prominent commercially available alkylene oxides.

The District Court also erred because it failed to *combine* the teachings of the prior art disclosures of Windemuth and Sokol in one instance, and the Bayer article and Hill patent in another, and instead, considered each as an isolated disclosure. (See Point III).

4. Heiss' alleged invention, as now *claimed*, was first recognized and literally derived from reading the Price patent which issued on December 30, 1958. Dr. Charles C. Price conceived and reduced to practice in 1949 all

aspects of the invention now claimed by Heiss. The Heiss patent is therefore invalid because of prior invention by Dr. Price. (See Point IV).

5. Heiss simply did not make the claimed invention. His claims are for a *two* component system—a particular polyol and a polyisocyanate. However, Heiss' pre-application experiments, his written invention disclosure, the Heiss patent application, the first five years of its prosecution in the Patent Office and the corresponding patents in Australia and Great Britain all prove that Heiss' invention was for a *three* component system—the third and most critical component being a plasticizer. Omission of the plasticizer from the claims materially alters the nature of Heiss' alleged invention. Heiss' *claimed* invention is therefore distinctly different from his *actual* invention and renders the patent invalid under 35 U.S.C. § 112. (See Point V).

ARGUMENT

POINT I

The District Court erred as a matter of law because it ignored the legal principle that unexpected properties must be disclosed in the patent to be relied on for patentability.

Holding that "Windemuth was prior art" (25a; 23a) the District Court found that:

" . . . the only fundamental difference between Windemuth and Heiss was the use of propylene oxide, rather than ethylene [oxide]. . . ." (25a)

Then, relying exclusively on alleged unexpected properties of propylene oxide based urethanes over ethylene

oxide⁵ based urethanes, the Court below concluded that such properties rendered Heiss patentable over Windemuth (24a-28a). Reliance on such properties as the basis for patentability of Heiss was clearly erroneous because those properties are simply not disclosed in the Heiss patent. *Carter-Wallace, Inc. v. Otte*, 474 F.2d 529, 540 (2 Cir. 1972), cert. denied, 93 S.Ct. 2753 (1973).⁶

That the District Court predicated patentability of Heiss on findings that PO urethanes, as contrasted with EO urethanes, possessed the unexpected properties of being less subject to a) water sensitivity,⁷ b) hydrolysis,⁸ and c) crystallization, is shown by the District Court's repeated findings and conclusions on this point including:

" . . . Windemuth had in mind only ethylene [oxide] and did not know or recognize the special qualities of propylene oxide. . . ." (24a)⁹

* * *

" . . . Propylene oxide based foams are resistant to water sensitivity and crystallization and can be produced in both rigid and flexible form. . . ." (25a)

* * *

" . . . Polypropylene oxide based urethanes being less subject to water sensitivity and crystallization than

⁵ Hereinafter, propylene oxide may be referred to as PO, ethylene oxide as EO. *

⁶ This case was cited and argued to the Court below but no mention of it is made in the opinion.

⁷ Water sensitivity as used in this case means both the ability to absorb water and hydrolysis.

⁸ Hydrolysis means chemical decomposition by water.

⁹ Ironically, neither did Heiss know or recognize the special qualities of PO until he, or his patent attorney, saw the Price patent in 1959. (See Point IV C)

ethylene oxide based urethanes rendered the former an advance in the art. . . ." (26a)

* * *

" . . . I find that the water resistant properties of polyether propylene oxide based urethanes which give them great commercial superiority over polyether ethylene oxide based urethanes would not have been obvious to one of ordinary skill in the art at the time of the Heiss application." (26a)

* * *

" . . . A person of ordinary skill in the art at the time of the Price, Heiss experiments would, it seems to me, reach the conclusion that there was no distinction in reference to water sensitivity and hydrolysis between using ethylene and propylene." (27a)

* * *

" . . . it is difficult for me to give credence to a contention that an ordinary journeyman would have understood that propylene oxide had these unexpected qualities in 1950 and 1951." (28a)

But not a single one of these asserted unexpected properties is disclosed in the patent as being possessed by use of PO (polypropylene) polyether as distinguished from use of EO (polyethylene) polyether in making polyurethanes. The testimony of Dr. Colburn, Jefferson's expert, on this point is dispositive (408a):

"Q. Dr. Colburn, looking at my notes it seems that you made a distinction with regard to polyethers between polyethylene polyethers and polypropylene polyethers. Do you recall that?

A. Yes.

Q. That, as I understood, had to do with water sensitivity?

A. It had to do with the water sensitivity of the polyurethanes made in the two respective cases.

Q. Water sensitivity of the product, the polyurethane product made of the two?

A. That is right.

Q. With reference to the Heiss patent, do you find any such difference disclosed in the patent specification?

A. No, I don't."

Mr. Heiss, when asked if his patent set forth any relative comparison of the properties of EO and PO urethanes, testified that he could not remember without reading the patent. When asked to read the patent, Jefferson's counsel interjected and suggested it was unnecessary for Mr. Heiss to read the patent, stating (337a):

"Mr. Sweeney: Your Honor, the patent speaks for itself. If it says it, it says it; if it doesn't, it doesn't."

A reading of the Heiss patent shows that there is no mention of "hydrolysis," no mention of "crystallization" and no suggestion that propylene oxide based foams are less subject to hydrolysis or crystallization than ethylene oxide based foams. In fact, the Heiss patent draws no distinction of any kind between use of EO or PO to make polyurethanes.

Indeed the equivalence of EO urethanes and PO urethanes is clearly established in the Heiss patent itself. There, the examples show the interchangeability of EO and PO to produce polyurethane products having virtually identical properties. Ethylene oxide is used in Examples XVIII-XXI; propylene oxide is used in Examples X and XII-XVII; and in Example XI the effects of EO and PO are compared. No distinction is noted. Anyone reading Example XI, or any of the other examples, would consider that there is no difference between PO and EO and that

they are equivalent for the purpose of making a polyurethane product (63a; 75a).

The lower Court's reliance on such undisclosed properties as the basis for patentability was clearly erroneous. In *Carter-Wallace, Inc. v. Otte, supra*, a parallel fact situation was presented. There, the patent was directed to a product identified as meprobamate, sold under the trademarks "Miltown" and "Equanil". The assertion was that the change in the prior art molecular structure that produced meprobamate made it one of the most effective tranquilizers the world has ever known and that these tranquilizing properties of the patented product would not have been obvious to a person having ordinary skill in the art (474 F.2d at p. 540).

Nevertheless, this Court found that despite the unexpected, superior, unobvious properties of meprobamate, the patent was invalid. This Court held that an essential link between unexpected properties and patentability is (p. 540):

" . . . that the novel, unexpected, or superior non-obvious property must be disclosed in the patent application or at least in supporting documents in order to be relied upon as a basis for patentability. . . ."

To the same effect, see *Tinnerman Products, Inc. v. George K. Garrett Co.*, 292 F.2d 137, 140 (3 Cir. 1961).

Since the Heiss patent failed to disclose any novel, unexpected or superior non-obvious property now asserted to result from using PO, it was clearly erroneous for the lower Court to rely on such properties as a basis for patentability.

Predicating patentability on undisclosed properties does violence to the underlying constitutional basis of the patent system which requires disclosure in return for the award of a patent monopoly. *Scott Paper Co. v. Marcalus Mfg.*

Co., 326 U.S. 249, 255 (1945). To hold that Jefferson is now entitled to assert a patent monopoly against a one-half billion dollar a year industry solely for superior properties which the alleged inventor did not recognize or disclose is to make a mockery of the patent system.

POINT II

The District Court erred in concluding that the Heiss patent was not anticipated by the prior art Windemuth patent.

The Windemuth patent (Px 5, 696a) anticipates the subject matter of the Heiss claims in suit under 35 U.S.C. § 102(e).¹⁰

In determining novelty under that section, the question is not whether Windemuth recognized any special properties of propylene oxide¹¹ but whether Windemuth's disclosure teaches one skilled in the art to use propylene oxide in making a polyurethane product. That all elements of Heiss are taught by Windemuth is vividly demonstrated by the following element-by-element comparison of representative claim 3 of Heiss and the pertinent Windemuth disclosure:

¹⁰ Windemuth is clearly prior art under 35 U.S.C. § 102(e) because its effective date is May 6, 1952, prior to Heiss' alleged reduction to practice. Heiss could not have reduced the invention to practice before Windemuth. September 19, 1952 is the first time he used a propylene oxide triol in any of his experiments (312a-313a; 294a-295a; 979a).

¹¹ The failure of a prior art patent to recognize superior properties does not detract from its anticipatory effect. *General Electric Co. v. Jewel Incandescent Lamp Co.*, 326 U.S. 242, 247 (1945).

Heiss Claim 3

The reaction product of

1) a condensate of propylene oxide and a polyhydric alcohol having from 3 to 4 hydroxyl groups, and

2) an organic polyisocyanate,

the amount of (2) being in excess of that theoretically required to react with the reactive hydrogens of said condensate.

Windemuth Patent
(Px 5, 696a)

In accordance with the present invention we have found that polyglycolethers . . . can be reacted with . . . isocyanates (Col. 1, ls. 31-35).

It is known in the art to produce polyglycolethers . . . by polymerizing alkylene oxides, for instance ethylene oxide, or by chemical addition of alkylene oxides¹² to . . . polyfunctional alcohols such as . . . trimethylolpropane,¹³ pentaerythrite¹⁴ (Col. 1, ls. 20-25).

Examples of isocyanates are . . . appropriate polyfunctional isocyanates such for example as . . . toluylene diisocyanate¹⁵ (Col. 1, ls. 41-47).

Products of considerable importance are obtained by reacting polyfunctional glycolethers and polyfunctional isocyanates in quantities larger than those required for saturating the hydroxyl groups present (Col. 2, ls. 59-62).¹⁶

¹² "Alkylene oxides" refers to a class of compounds in which ethylene oxide and propylene oxide are the first and second members respectively. EO and PO are also the two most prominent members of the class (419a-420a).

¹³ "Trimethylolpropane" is a polyhydric alcohol having 3 hydroxyl groups (84a).

¹⁴ "Pentaerythrite" (same as pentaerythritol) is a polyhydric alcohol having 4 hydroxyl groups (83a).

¹⁵ "Toluylene diisocyanate" (TDI) is an organic polyisocyanate used by Heiss (83a).

¹⁶ Jefferson's expert agreed that this portion teaches use of an excess of polyisocyanate (429a-430a).

The only distinction¹⁷ the Court below made between the Windemuth disclosure and the Heiss claims in issue is reflected by its finding that (25a):

" . . . the only fundamental difference between Windemuth and Heiss was the use of propylene oxide, rather than ethylene. . . ."

This finding of difference is clearly erroneous. It completely ignores Windemuth's express disclosure to use "alkylene oxides". It is also internally inconsistent with the Court's acknowledgment that (24a):

" . . . all experts at trial concede, that alkylene oxide includes ethylene and propylene oxide."

The record demonstrates that a chemist would understand that Windemuth's teaching to use

" . . . alkylene oxides, for instance ethylene oxide. . . ."
(Px 5, 696a, col. 1, l. 22)

and its teaching to use

" . . . chemical addition of alkylene oxides to . . . polyfunctional alcohols" (col. 1, ls. 23-24)

is a teaching to use propylene oxide to make the condensate.

Propylene oxide is now and since about 1950 has been one of the two most prominent alkylene oxides¹⁸ (419a-420a).

¹⁷ In its opinion, the District Court also suggests that Windemuth's disclosure is limited to a condensate with *two* hydroxyl groups (24a). This is a clear error. At column 1, line 33, Windemuth discloses a condensate having "*at least two*" hydroxyl groups. Claims 16 and 22 refer to a polyalkylene ether having "*three*" and "*at least three*" hydroxyl groups respectively. Examples 1, 2 and 4-10 each specifically use trimethylolpropane which provides a condensate having *three* hydroxyl groups. Examples 7 (at col. 7, l. 34) and 12 each use pentaerythrite which provides a condensate having *four* hydroxyl groups.

¹⁸ For practical commercial purposes, the limited class of compounds defined by alkylene oxides is ethylene oxide, propylene oxide and perhaps one or two others (84a; 419a).

Dr. Colburn, Jefferson's expert, conceded that the opening description in the Windemuth patent (Px 5, 696a, Col. 1, ls. 20-25) suggested use of propylene oxide to a chemist (424a):

"Q. Now, I'll ask you whether that doesn't suggest to a chemist that he can use propylene oxide as well as ethylene oxide for addition to a poly-functional alcohol or polyhydric alcohol having 3 to 4 hydroxyl groups?

A. Yes, that part of the patent, taken by itself, would so suggest."

After reading the portions of Windemuth at column 1, lines 20-23, 31-39, 40-53, Dr. Colburn further testified (428a):

"Q. Don't these three parts that I have read to you indicate to a chemist that he may, if he wishes, react polypropylene oxide and the polyhydric [sic] alcohol having 3 to 4 hydroxyl groups with an organic polyisocyanate to produce a polyurethane resin?

A. Yes. If he wished to carry out this reaction, this generalization would suggest that that reaction would go."

This is a concession by Jefferson's expert that Windemuth taught everything claimed by the Heiss patent.

The evidence in this case is overwhelming that to a chemist, Windemuth's use of the term "alkylene oxides" is a teaching of propylene oxide. Dr. Mark, plaintiff's expert testified to this fact (84a-86a). Dr. Charles C. Price, a professor of chemistry at the University of Pennsylvania and past president of the American Chemical Society, agreed (201a-202a):

"The Windemuth patent very clearly discloses propylene oxide in the use of the term polyalkylene oxide."

Dr. Flores, who in August 1952 prepared the propylene oxide condensate for Mr. Heiss' use, also testified that "alkylene oxide" includes both ethylene oxide and propylene oxide (293a). Significantly, the pages of Dr. Flores'

1952 notebook which describe his preparation of the propylene oxide condensate are labeled "Alkylene Oxide Condensates" (Dx AH, 1041a-1044a).

Mr. Monaghan, Jefferson's Vice-President of Marketing, likewise equated alkylene oxide to propylene oxide (254a-255a).

Mr. Heiss himself admitted that the term "alkylene oxide" appearing at column 2, line 28 of his patent describes propylene oxide (339a). The mention of alkylene oxide at this point in the specification is the only support that exists in the patent for Heiss' claim to use of a PO condensate with *four* hydroxyl groups. Thus, the patent itself necessarily relies on the term alkylene oxide to mean propylene oxide.

The evidence here compels the conclusion that propylene oxide is as explicitly taught in Windemuth by the teaching of the use of alkylene oxide as if propylene oxide were specifically named.¹⁹

Moreover, the Windemuth patent also discloses use of propylene oxide explicitly by its direction to use the polyglycolethers "known in the art" which are produced by "... chemical addition of alkylene oxides to ... polyfunctional alcohols such as ... trimethylolpropane, pentaerythrite. . . ." (Px 5, 696a, col. 1, ls. 23-25). Exemplary of such "known in the art" polyglycolethers is the patent to Sokol No. 2,527,970 granted in 1950²⁰ (Px 6, 702a-706a; 85a-88a). Sokol describes the production of certain polyglycolethers by the reaction of "alkene oxides" (same as

¹⁹ Implicit disclosure also constitutes anticipation under 35 U.S.C. § 102. *Monsanto Co. v. Rohm and Haas Co.*, 312 F. Supp. 778, 796-797 (E.D. Pa. 1970), *aff'd*, 456 F. 2d 592 (3 Cir. 1972), *cert. denied*, 407 U.S. 934 (1972); *Application of Rosicky*, 276 F. 2d 656, 659-660 (C.C.P.A. 1960).

²⁰ The District Court erred in holding the Sokol patent as "not prior art" (25a). The Sokol patent issued in 1950 (erroneously stated in the opinion at 22a to have issued in 1960) and therefore is clearly prior to both Heiss and Windemuth.

alkylene oxides, 87a) and polyfunctional alcohols. These polyglycolethers are described expressly in Sokol as being made by the reaction of propylene oxide and pentaerythritol (Px 6, 702a, col. 1, ls. 4-10) and also by the reaction of ethylene oxide and pentaerythritol (col. 2, ls. 2-14).

Dr. Colburn, Jefferson's expert, admitted that Windemuth referred a chemist to the prior art for examples of polyglycolethers formed by chemical addition of alkylene oxides to polyfunctional alcohols, and that the prior art, as illustrated by Sokol, showed such examples to be condensates of propylene oxide and ethylene oxide (424a-425a):

"Q. Is it also correct, from the introduction of the paragraph I read, namely, 'It is known in the art to produce,' that Windemuth states that that information was in the art prior to him?

A. Yes, that's right.

Q. Doctor, I show you plaintiff's Exhibit 6, which we call here the Sokol patent, and I ask you whether that is not such a prior art patent showing the reaction of propylene oxide and ethylene oxide with a polyhydric alcohol of either 3 or 4 hydroxyl groups, to form a condensate.

A. Yes. This patent does show what you just described."

For the above reasons it is beyond dispute that Windemuth's disclosure to use "alkylene oxides" is a teaching to use propylene oxide. Therefore, Windemuth constitutes a full anticipation of Heiss under 35 U.S.C. § 102(e).

POINT III

The Heiss patent is obvious from the prior art.

A. Using Propylene Oxide Is Obvious From Windemuth's Disclosure of "Alkylene Oxides"

While we submit that Windemuth anticipates the claims in suit under 35 U.S.C. § 102(e) (See Point II), it is clear

that, if not anticipatory, Windemuth renders these claims obvious and therefore invalid under 35 U.S.C. § 103. Section 103 provides:

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."

The sole "difference" between Windemuth and Heiss is that Windemuth teaches the use of *alkylene oxides* and Heiss claims the use of *propylene oxide*. This is a difference in semantics—not a difference in substance. For the same reasons set forth in Point II, Windemuth's teaching of the use of "alkylene oxides" makes the use of propylene oxide so clear to a chemist that such use would have been obvious. The patent cannot be saved by reliance on unexpected properties, commercial success or other considerations.²¹

The lower Court's focus and reliance on unexpected properties was clear error. Unexpected properties do not erase Windemuth's teaching to use "alkylene oxides". That teaching is an explicit instruction to use propylene oxide, an obvious choice indicated to any ordinary chemist.²² (See Point II).

²¹ It is well established that commercial success without invention will not make patentability. *Great A&P Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 153 (1950); *Jungersen v. Ostby & Barton Co.*, 335 U.S. 560, 567 (1949), affirming *Jungersen v. Baden*, 166 F.2d 807, 811 (2 Cir. 1948); *E.J. Brooks Co. v. Stoffel Seals Corp.*, 266 F.2d 841, 844 (2 Cir. 1959).

²² It would also be obvious, under 35 U.S.C. § 103, from a combination of Windemuth and Sokol, to use propylene oxide as the alkylene oxide of Windemuth. Dr. Colburn conceded as much (424a-425a). See also pages 17-18.

Indeed, Windemuth's specific use of EO would, in and of itself, have been sufficient to render the use of PO obvious in the same reaction. PO is the next adjacent homolog of EO (58a). Substitution of PO for EO is therefore presumed unpatentable. *Application of Coes*, 173 F.2d 1012, 1014 (C.C.P.A. 1949). In *Application of Henze*, 181 F.2d 196 (C.C.P.A. 1950) the Court stated it concisely (p. 201):

"In effect, the nature of homologues and the close relationship the physical and chemical properties of one member of a series bears to adjacent members in [sic] such that a presumption of unpatentability arises against a claim directed to a composition of matter, the adjacent homologue of which is old in the art. . . ."

This principle applies with even greater force in this case since Jefferson's expert witness, Dr. Colburn, conceded that EO and PO were known to be equivalent in chemical reactions (419a):

"Well, in the case of most reactions, at least, if you told me it went with ethylene oxide, I would know that it would go with propylene oxide."

It is well established that the mere substitution of known equivalents does not constitute an invention. See *Dow Chemical Co. v. Halliburton Co.*, 324 U.S. 320 (1945) where the Court said (page 330):

". . . It is elemental that the mere substitution of equivalents which do substantially the same thing in the same way, even though better results may be produced, is not such an invention as will sustain the patent. *Dunbar v. Meyers*, 94 U.S. 187, 199; *Smith v. Nichols*, 21 Wall. 112, 119."

Here, obviousness is so striking that the Heiss patent is clearly invalid under 35 U.S.C. § 103.

B. The Prior Art of Bayer and Hill Makes the Invention Obvious

Even without considering the Windemuth patent, by applying the standards to determine obviousness set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966), the Heiss patent is invalid under 35 U.S.C. § 103 over the *combination* of the disclosures in the Bayer article (Px 7B, 707a-739a), published in 1947, and Hill patent No. 2,726,219 (Px 9, 740a).

Heiss' claims to be compared with the prior art may be summarized as follows: A polyurethane product made by reacting a particular polyether polyol, to wit, a condensate of propylene oxide with an alcohol having 3 to 4 hydroxyl groups, with an excess of polyisocyanate.

Dr. Otto Bayer was the originator of polyurethane chemistry (89a). His 1947 article in "Angewandte Chemie", discloses the basic principles of making polyurethanes by reacting any polyol with an excess of polyisocyanates²³ (Px 7B, 713a; 89a-92a). The reaction forming the polyurethane is always between the OH groups of the polyol and the NCO groups of the isocyanate (53a-56a). It makes no difference whether the backbone of the polyol is a polyether or a polyester (94a). Bayer teaches that difunctional polyols (e.g., glycol or diol) form linear chains and that trifunctional (triol) or tetra functional (tetrol) polyols lead to reticulation (i.e., cross-linking) (Px 7B, 713a; 89a-90a). Cross-linking produces a product which may be elastic or hard. Thus, an important principle that Bayer teaches is that cross-linking may be effected by the use of a triol or a tetrol (90a).

Bayer specifically discloses use of polyester polyols (Px 7B, 733a; 92a) and polyether polyols (Px 7B, 723a; 91a-92a; 144a). Dr. Colburn conceded Bayer shows use of

²³ For an explanation of the chemical terms used here, see "Background Chemistry" section at the end of this brief.

polyethers (431a-432a; 723a). He also conceded Bayer discloses use of triols or tetrols for cross-linking (432a).

Thus, the only difference between the Heiss claims and Bayer is the use of a propylene oxide backbone in the polyol.

The Hill patent²⁴ (Px 9, 740a) supplies this missing link. It expressly teaches use of the propylene oxide backbone in polyols for polyurethane reactions.

Hill is directed to the preparation of polyurethane sponges (i.e., foams) formed by reacting polyalkylene ether glycols (i.e., diols) with an excess of polyisocyanate (Px 9, 740a, col. 2, 1.65; 95a). As his polyol, Hill uses both polyethylene ether glycols (ethylene oxide condensates) and polypropylene ether glycols (propylene oxide condensates) having two hydroxyl groups. To form a foam, Hill achieves the cross-linking effect by adding water as another ingredient (369a). Thus, the only difference between Hill and Heiss is that Hill uses a propylene oxide polyol with *two* OH groups while Heiss claims using a propylene oxide polyol with *three* or *four* OH groups (96a).

The District Court's conclusion that (25a)

" . . . the Hill Patent cannot be considered prior art; although he utilized a propylene oxide condensate, he obtained cross linkage through an entirely different process. . . ."

shows that it considered Hill in isolation. The lower Court clearly failed to evaluate the question of obviousness of Heiss in view of the *combination* of the Hill and Bayer teachings.

²⁴ The Hill patent issued December 6, 1955 on an application filed August 24, 1951. Since Hill's filing date is prior to any date of Heiss' invention alleged by Jefferson, the Hill patent is effective prior art. *Hazeltine Research Inc. v. Brenner*, 382 U.S. 252 (1965).

The pertinent teaching of Hill, recognized by the Court, is in use of the propylene oxide condensate. The pertinent teaching of Bayer, conceded by Dr. Colburn, is in use of triols and tetrols to obtain cross-linkage. Thus, it is within the level of ordinary skill, and therefore obvious to one skilled in the art, to use a propylene oxide backbone in Bayer's triols or tetrols to cross-link a polyurethane product. The method of achieving cross-linkage is a mere matter of choice to a chemist.

The Heiss claims are also invalid under 35 U.S.C. § 103, in view of Bayer and Hill.

POINT IV

The Heiss claims are invalid because of prior invention by Charles C. Price.

Title 35 U.S.C. § 102(g) provides, in pertinent part:

"A person shall be entitled to a patent unless—

* * *

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. . . ."

General presented evidence that the subject matter claimed in the Heiss patent was invented in 1949 by Dr. Charles C. Price and that Dr. Price was the prior inventor. The evidence consisted of:

- (a) the oral testimony of Dr. Price regarding the circumstances and acts of his invention *and* corroborating oral testimony of Dr. Ralph Herbst who successfully reacted a condensate of propylene oxide and a tetrol with an excess of polyisocyanate; this constituted a reduction to practice of the invention;

- (b) further corroborating contemporaneous documents written by Dr. Herbst to Dr. Price and by Dr. Price to General; and
- (c) documentary evidence that Heiss derived his invention from Price.

The District Court stated that to establish prior invention, General had a legal burden "as absolute as in a criminal case" and then found that the two contemporaneous written reports (Px 18, 782a; Px 19, 783a) were "disjointed and incomplete" and did "not make explicit that the process here in question was successfully concluded" (29a).

It is respectfully submitted that the District Court clearly erred in holding that General's evidence failed to sustain the burden of proving prior invention by Dr. Price.

A. Oral Testimony Proving Prior Invention by Dr. Price

Dr. Charles C. Price, presently Benjamin Franklin Professor of Chemistry at the University of Pennsylvania, is recognized as an outstanding chemist in the field of polymer chemistry. He has received the American Chemical Society Award in Pure Chemistry and other awards and recognition for his research activities including his work on synthetic rubber (147a-151a).

During the period from 1946 to 1954, Dr. Price was the head of the Chemistry Department at the University of Notre Dame. In January 1949, as a member of the National Research Council Committee advisory to the Quartermaster Corps, Dr. Price was asked to organize a research conference to consider the then serious problem of developing a rubber that would withstand very low temperatures. A group of scientists met in Washington for several days to exchange information and to discuss this problem (152a-153a). As a result of this conference, Dr. Price conceived the idea that if propylene oxide molecules could somehow

be incorporated into a long chain network structure, it could be a useful rubber type product. Upon his return to Notre Dame, Dr. Price investigated the literature and found that nobody had been able to make a polyether of propylene oxide in a long enough chain (a high enough molecular weight) to produce a good rubber (153a-154a; Dx C, 844a-845a).

Dr. Price testified that he decided on several avenues of investigation and selected Dr. Ralph Herbst, Jr., a graduate student who had just finished his doctoral dissertation in March 1949, to work on this project (154a-155a). Money for the project was provided by General under an arrangement which General had with the University of Notre Dame to provide financial support for certain research projects (Px 16, 780a; Px 17, 781a; 156a-158a).

One of the first ideas that Dr. Price outlined to Dr. Herbst was that of making a new type of rubbery product by reaction of diisocyanates and propylene oxide condensates of polyols containing three or four hydroxyl groups (155a-156a; 212a). To Herbst, the concept seemed like a "revolutionary idea" (213a).

Both Dr. Herbst and Dr. Price testified that working under supervision and instructions from Dr. Price, Dr. Herbst's first step was to react propylene oxide with pentaerythritol (a polyhydric alcohol having four hydroxy groups) to prepare the polyol condensate (164a; 212a-213a). Herbst testified he placed the condensate in several test tubes, some containing a solvent and others without a solvent. He then added diisocyanate, drop by drop, with an eye dropper. When the polyol reacts with diisocyanate, heat is generated. Herbst testified that as he added the diisocyanate he felt the heat being generated, and that this was a positive indication that the desired reaction was taking place. He cooled the test tubes between addition of drops of diisocyanate and continued adding diisocyanate until heat evolution ceased. This was a

practical indication that all of the hydroxyl groups of the condensate had reacted with the NCO groups of the isocyanate and that there were no more hydroxyl groups left to react. At this point a solid mass formed in the bottom of the test tube. Dr. Herbst testified that he continued to add a few more drops to insure that an excess of isocyanate had been used (214a-215a; 225a).

Dr. Herbst testified that the test tubes were then broken to remove the products. He found that the reactions which were made in the presence of solvents produced a rubbery material (215a-216a). This result was exactly what Dr. Price had conceived and predicted.

Because there had been considerable skepticism by Herbst's associates and the professors at Notre Dame that liquid propylene oxide condensates could be converted into a rubbery type product, Herbst was quite excited when he obtained samples having rubbery properties (214a). Dr. Herbst immediately reported the results to Dr. Price and he and Dr. Price bounced the marble-sized rubbery material on Dr. Price's desk (161a-162a; 214a).

The Herbst experiments conclusively demonstrated, in April 1949, the ability of a propylene oxide condensate of a polyol having four hydroxyl groups to react with a polyisocyanate to produce a rubbery product which was in fact a polyether polyurethane product. The testimony of Dr. Herbst, an unbiased person who has had no connection with General and has no financial interest in the outcome of this case (219a), corroborating the testimony of Dr. Price, proved completion of the invention by Dr. Price by reduction to practice in 1949.

B. Documentary Proof of Prior Invention by Dr. Price

On April 7, 1949, Dr. Price wrote to G. H. Swart, the Director of Research at General requesting more funds for the necessary exploratory work of his ideas. The letter

states in part (Px 16, 780a):

"Dear Gil:

"We have put Ralph Herbst, who has now finished his dissertation research, on the job of making some 'propylene oxide rubber'. You remember we discussed this on my last visit to Akron. I am more enthusiastic about the practical application of this than anything I have ever worked on. . . ."

This letter, the authenticity of which has not been questioned, demonstrates that by April 7, 1949 Dr. Price had already conceived of the idea of using the specific propylene oxide backbone which the District Court held to be the distinctive component of Heiss' invention, and that Dr. Herbst had been put on the job to investigate the use of propylene oxide in this project. On April 18, 1949, General authorized additional funds for the project (Px 17, 781a).

Dr. Herbst's testimony is fully corroborated by a contemporaneous Progress Report written by Dr. Herbst to Dr. Price on April 19, 1949 (Px 18, 782a). The report is clear that PO condensates were first prepared by two different methods, in each of which 6.8 grams of pentaerythritol was reacted with 70 cc. of propylene oxide, to form the condensate (164a). The condensate was then reacted with various isocyanates and the results tabulated (164a; 174a). The table shows a total of eight experiments were conducted in which the propylene oxide condensate was reacted with three different diisocyanates (designated IPD, MDI and OID in Px 18). One group, designated "B" in the table which was carried out in the presence of a solvent, produced a rubbery material (162a; 174a-177a). The other group of reactions, designated "A" were carried out in the absence of a solvent (164a). They also resulted in polyurethane products which were brittle but suitable for other practical uses and applications (177a).

The report (Px 18, 782a) was signed and dated by Dr. Herbst, and delivered to Dr. Price who then made certain handwritten entries thereon (163a). Px 19 (783a—see also typeoff following 783a) is the retyped report submitted by Dr. Price to General (163a; 165a).

Dr. Price's invention was not abandoned, suppressed or concealed (180a-181a). On September 23, 1953, a patent application was filed on behalf of Dr. Price in the United States Patent Office and issued as Patent No. 2,866,774²⁵ on December 30, 1958 (Dx A, 839a; 183a-184a).

Therefore, it is submitted that the two contemporaneous reports, Px 18 (782a) and Px 19 (783a) evidence a complete and successful reduction to practice of what Heiss now claims as his invention. These two reports prove prior invention by Dr. Price beyond a reasonable doubt. To a chemist, there is nothing "disjointed and incomplete" about the written contemporaneous reports.

In *Corona Cord Tire Co. v. Dovan Chemical Corp.*, 276 U.S. 358 (1928), the issue was whether the Weiss patent was invalid by reason of prior invention by one, Kratz. The invention was directed to the use of DPG as a catalyst to increase the speed of the vulcanization of rubber and to make improved rubber compounds. Weiss filed an application for patent in 1921 for an invention he claimed to have made in 1919. The Court held the patent invalid on the proof of Kratz' prior invention in 1916, stating (pp. 382-383):

" . . . what he [Kratz] did at Norwalk, supported by the evidence of Dr. Russell, his chief, and by the indubitable records that are not challenged, leaves no doubt in our minds that he did discover in 1916 the strength of D.P.G. as an accelerator as compared with

²⁵ It is this patent which came to the attention of Heiss' patent attorney in 1959 which inspired Heiss to "make the invention". (See Point IV C)

the then known accelerators, and that he then demonstrated it by a reduction of it to practice in production of cured or vulcanized rubber.

"This constitutes priority in this case. . . ."

In *United Shoe Machinery Corp. v. Brooklyn Wood Heel Corp.*, 77 F.2d 263 (2 Cir. 1935), this Court reversed the District Court and found that, although a key piece of physical evidence had vanished, three undated photographs and dated drawings were sufficient to corroborate inventors' testimony and satisfy the severe measure of proof to establish the defendant's priority.

Moreover, proof by oral testimony, if of sufficient reliability and cogency, is just as effective as written evidence to establish a prior invention. *King Gun Sight Co. v. Micro Sight Co.*, 218 F.2d 825, 827 (9 Cir. 1955); *Whiteman v. Mathews*, 216 F.2d 712, 716 (9 Cir. 1954). In ignoring the oral testimony of Dr. Price and Dr. Herbst, and implying that only the original lost notebook records would be sufficient to meet the burden of proof, the District Court erred.

In the instant case, clear and convincing proof of prior invention is present in the form of both oral testimony and contemporaneous written documents, each corroborating the other (Px 16, 780a; Px 17, 781a; Px 18, 782a; Px 19, 783a). Prior invention by Dr. Price has been established.

C. Heiss Derived the Claimed Invention From Price

Heiss never claimed use of propylene oxide prior to the issuance of the Price patent (Dx A, 839a). Then, on February 6, 1959, claims to the use of propylene oxide were introduced into the Heiss application for the first time (Px 2, 600a-611a). Such claims were copied from the Price patent by Mr. Upchurch, attorney for Heiss, who then requested the declaration of an interference. Thus, Heiss' claims to use of propylene oxide were not due to

any prior or independent recognition by Heiss, but rather were a direct result of reading the Price patent.

That Heiss did not originally recognize or attribute any significance to use of propylene oxide in making a polyurethane is clear from his failure to disclose in his patent application any different or unexpected properties resulting when propylene oxide is used. Contrast this with Dr. Price's evidence of invention and disclosure. In 1949 Dr. Price immediately penetrated to the heart of the problem when he conceived of using propylene oxide as the specific backbone for his new rubbery type product (Px 16, 780a). The Price patent—not the Heiss patent—contains the disclosure of the superior properties obtained by using propylene oxide. See Dx A (839a) where the patent states at column 2, lines 63-68:

“In accordance with the present invention, I have also found that polymeric materials built with alkylene oxide units having at least three carbon atoms, such as *propylene oxide units*, are far superior to those built with *ethylene oxide units* because the resultant rubbery product has improved water resistance and less tendency to crystallize. . . .” (Emphasis added)

These are the “unexpected” properties that Price recognized—but that both Windemuth and Heiss failed to recognize.

That Heiss first “discovered” the claimed invention from the Price patent, is demonstrated by Heiss' corresponding British patent (Px 11, 745a) where the claims do not mention propylene oxide (754a). Heiss' attorney, in explaining the discrepancy between the British claims and the U. S. claims stated (Px 39, 827a):

“. . . We were unable to obtain claims in Great Britain corresponding to the ones in our U.S. 3,102,875 because claims of the type in the British patent had

already been published when we learned of the Price patent."

This is a clear admission that the "invention", as set forth in the claims of the Heiss patent, was derived from the Price patent. Had the United States Patent Office proceedings not dragged on for so many years, Heiss would not have "discovered" the invention in time to lay claim to it in his application.

Heiss, having recognized and derived the invention from the Price patent, is inherently later than Price. Dr. Price is the prior inventor thereby rendering the Heiss patent invalid under 35 U.S.C. § 102(g).

POINT V

The District Court erred because it did not find the Heiss claims invalid under 35 U.S.C. § 112 for failure to include a plasticizer—an essential component of the invention.

While the District Court made no finding on General's pleaded assertion that the Heiss patent is invalid under 35 U.S.C. § 112, the record clearly shows that substantial evidence and arguments on this point were presented to the Court.

Title 35, United States Code, Section 112, requires that:

"The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention."

It is submitted that the claims of the Heiss patent are invalid because they do not point out what Mr. Heiss regarded as his invention. The Heiss claims define an alleged invention which is basically a *two* component system. The two components are the specific polyol and the isocyanate.

There is a plethora of evidence to show, however, that if Heiss made any invention at all, it was for a *three* component system, and that for over five years after the filing of his patent application, the invention was regarded and repeatedly emphasized by Heiss and his attorneys to be an invention for a three component system—the third and most essential component of the invention being an organic liquid, frequently referred to by Heiss as a *plasticizer*. Failure of the Heiss claims to include the plasticizer component renders them invalid under Section 112.

The essentiality of the plasticizer component is conclusively demonstrated by every stage of Heiss' work—from his initial experiments through the first five years of prosecution of the Heiss patent application. To demonstrate this we will examine Heiss' work on the alleged invention prior to filing the application, his invention disclosure to his patent attorney, the description of the invention in the Heiss patent specification, admissions as to the essentiality of the plasticizer by Heiss' two successive patent attorneys, and Heiss' corresponding patents in Great Britain and Australia.

A. Heiss' Activities Prior to Filing the Application

From June to August 1952, Mr. Heiss was engaged in a research project aimed at solidifying a plasticizer liquid (known under the Monsanto trademark as "Aroclor"), for use as a potting resin (i.e., a resin used to encapsulate or "pot" electrical components) (295a). In a series of experiments Heiss reacted a triol known as triethanolamine (TEA) with diisocyanate (TDI) in the liquid Aroclor²⁶ (318a-323a). These experiments were inconclusive (Px 29, 818a).

On September 19, 1952, Heiss was working on a different project—to make an adhesive liquid (294a). In this ex-

²⁶ This group of experiments is exemplified by Examples I, II, and IV-VIII of the Heiss patent.

periment, for the very first time, Heiss reacted a propylene oxide triol with diisocyanate in a benzene solution (295a; 312a-313a; Dx AC, 979a). The experiment failed as a liquid adhesive because it solidified, but it gave Heiss an idea for his Aroclor solidification project, because on September 22, 1952 the following entry appears in his notebook (Dx AC, 979a; 315a):

"On standing over the weekend this product changed to a clear transparent solid containing many fissures. This looks like a good way to solidify Aroclor."

He then ran an experiment substituting Aroclor for the benzene and found that it did solidify the Aroclor.

For the next three months Heiss did not do any work to follow up the September experiment (324a). Then, on January 6, 1953, work on the Aroclor solidification project, that had stopped in August 1952, was resumed by Heiss' lab assistant, Billy R. Davis. His first notebook entry was (Dx AE, 990a):

"Preparation of Aroclor—TDI—Triol Adducts

"This is a continuation of previous work done on the solidification of Aroclor with TDI adducts."

From January 6, 1953 to March 9, 1953 Davis ran experiments to evaluate three component systems—the components being

- (a) plasticizer, usually Aroclor,
- (b) diisocyanate, and
- (c) EO and PO triols (Dx AE, 990a-1040a; Dx AD, 980a-989a).

The sole object of every experiment was to solidify Aroclor or similar plasticizer fluids. The plasticizer fluid was always an indispensable component as shown by the title of many pages of the Davis notebook indicating the

three component system. Pages 89911-89912 study the effect of varying the Aroclor content (1000a-1001a); pages 89913-89914 study the effect of different Aroclors (1002a-1003a); pages 89915 and 89916 study the effect of plasticizers other than Aroclor (1004a-1005a; 342a); pages 89920-89921 study the temperature characteristics of the Aroclor-Trioi-TDI resins (1009a-1010a); pages 89923-89929 study the effect of substituting MDI for TDI in the three component system (1012a-1018a); the remaining pages deal with preparation and testing of the electrical characteristics of the three component system. It is clear from all this experimentation that the study was for a three component system and that the most essential component was the plasticizer.

On March 9, 1953, the project was terminated. Heiss summed up his work as follows (329a; Dx AD, 989a):

"In view of the difficulties encountered in the preparation of bubble-free resins, this project will be discontinued in favor of others that promise to be of shorter duration. It is felt that this solidification of fluids is of potential value, however, and the work will be resumed when we know more about isocyanate reactions.' "

A further summary of the work is contained in a report dated September 30, 1953, prepared by Dr. Saunders, and entitled "The Preparation of Potting Resins from Diisocyanates, Triols and Plasticizers" which also establishes that the object of the work was to solidify the plasticizer (Px 29, 817a).

From March 9, 1953 to August 7, 1953, the filing date of the Heiss application, no further work was done to react, for any purpose, a PO condensate with a polyhydric alcohol containing 3 or 4 OH groups with an excess of isocyanate (329a-332a). Thus, every experiment prior to the filing date, in which Heiss reacted the two components now al-

leged to be his invention, included a third component—the plasticizer.

What Heiss himself regarded as his invention is of prime importance. *Jungersen v. Baden*, 166 F.2d 807, 809 (2 Cir. 1948), aff'd sub nom. 335 U.S. 560 (1949). The preparation of the patent application was based on an invention disclosure dated February 13, 1953 submitted by Mr. Heiss to his patent attorney, Mr. Rucker (Px 60, 830a; 332a-334a). It is entitled "Solidification of Fluids with Isocyanates" and the fourth paragraph states that Heiss was looking for patent protection for his "original, novel idea of solidification of fluids."

The foregoing conclusively establishes that Heiss regarded his invention to be for the solidification of fluids, and for that invention, the fluid (or plasticizer), is necessarily the indispensable ingredient. There is no indication that Heiss recognized any usefulness of the TDI-PO triol reaction in the absence of the plasticizer.

Thereafter, on August 7, 1953, with additional disclosures for making foamed resins utilizing certain catalysts, a contribution in which Dr. James H. Saunders was a joint inventor, Application Serial No. 373,036 was filed in the United States Patent Office (Px 2, 510a-535a).

B. The Patent Specification

Indispensability of a plasticizer is demonstrated by the attention devoted by the patent specification to the function of the plasticizer component (Px 1, 502a, col. 4, ls. 1-19; 67a; 145a-146a). A plasticizer is a component of each of the 25 examples which are directed mainly to a study of the influence of the type and amount of the plasticizer (70a-71a; 75a-80a; 145a-146a). Examples XII, XIII, XIV and XVI study the effect of different amounts of chlorinated biphenyl (the plasticizer component); Examples V and XV

compare the effect of different plasticizers. The other examples explore operability of various diisocyanates and polyols in solidifying the plasticizer.²⁷

The only examples in the patent specification in which the claimed propylene oxide condensate is used are Examples X through XVII. The source of each one of these examples is a page of the Davis notebook which shows the experiments to have been part of the three component system study. (See page 34)

The patent specification does not contain a single example showing any reaction taking place in the absence of a plasticizer. In fact, as confirmed by Mr. Upchurch, Heiss' attorney, during the prosecution of the application, the last paragraph of the specification (Px 1, 506a, col. 11, ls. 6-17) points out that the plasticizer is necessary to obtain products having satisfactory properties (Px 2, 560a).

C. The Prosecution of the Application

On April 8, 1954, the Patent Office rejected all claims over the prior art (Px 2, 536a). The inventors' first attorney, Mr. Rucker, wrote to co-inventor, Dr. Saunders, on June 21, 1954, enclosing a copy of the Patent Office rejection and asking for his views. Dr. Saunders' response focused attention on what the inventors truly regarded as their novel points, stating (Px 28, 816a):

"I have to agree with the examiner that our broad claims aren't valid. I believe we do have *two novel points*—making foams from urethanes & isocyanates (with a strong catalyst), & *gelling the compatible organic liquids* (e.g. Aroclor). Would it be appropriate to refile, covering these separately & specifically? If

²⁷ Examples XXII to XXV, employing catalysts, are the only examples showing a foam and these are the contribution of Dr. Saunders (Px 28, 816a).

so, delete my name from the application on gelling the liquids." (Emphasis added)

Thus, Dr. Saunders defined the two inventions described in the application—one for foams prepared with a catalyst, as to which he was an inventor, and the other to gelling liquids, as to which Saunders made no contribution. It is the latter invention, "gelling the compatible organic liquids" which was the sole contribution of Heiss. Accordingly, on October 7, 1954, Mr. Rucker, in his response to the rejection by the Patent Office, emphasized that the claims included a plasticizer (Px 2, 542a):

"The claims now in this application are restricted to the products prepared by reacting an organic compound containing a plurality of urethane or thiourethane groups with a polyisocyanate in the presence of a catalyst and/or a non-reactive organic plasticizer . . ." (Emphasis added)

On March 12, 1957, in response to another rejection by the Patent Office, Mr. Upchurch, Heiss' second patent attorney, continued to urge the essentiality of the plasticizer component (Px 2, 560a):

"As applicants have pointed out in the last paragraph of their specification, the reaction between the compound having the urethane or thiourethane group with the isocyanate or thioisocyanate group must be brought about in the presence of the plasticizer in order to obtain a product having the improved flexibility. . . . They found that the reaction must be brought about while the reactants are associated with the plasticizer and claim such a process. The term 'organic plasticizer' has been used to describe the organic liquids and solvents making up the class of compounds described in the specification. Several illustrative examples of such compounds are listed in the last paragraph, page 6." (Emphasis added)

On January 27, 1958, in response to another rejection by the Patent Office, Mr. Upchurch again urged the indispensability of the plasticizer (Px 2, 583a):

" . . . Applicants, on the other hand, prepare a product which *contains* a plasticizer. Applicants *do not remove* their plasticizer from the product. It is absorbed or otherwise becomes dispersed in the product and remains there after solidification or gelling." (Emphasis in original)

This repeated emphasis by the inventors and their two successive patent attorneys, as to the essentiality of the plasticizer as a component of the invention precludes Jefferson from now asserting that the plasticizer is optional.

D. Heiss' Foreign Patents

That Heiss regarded his invention to require a plasticizer is further demonstrated by the patents which issued in Great Britain and Australia corresponding to Heiss' U.S. Application Serial No. 373,036 filed August 7, 1953 (104a-105a; Px 11, 745a; Px 12, 756a). Every claim in both of these patents specifies a non-reactive organic liquid (a plasticizer) as an essential component (105a-107a). These foreign patents were published before the Price patent issued.

In Px 38 (826a) and 39 (827a) Mr. Upchurch explains that he learned of the Price patent after the British patent had been published, and so it was too late to go back into those foreign patents to change the invention there set forth, into the invention he had learned from reading the Price patent. In fact, a comparison of the claims in the British patent and in the U.S. patent makes it difficult to believe that the claims emanate from the same application.

E. The Plasticizer Is an Indispensable Component of Heiss' Invention

Heiss' activities prior to the filing of his application, his own invention disclosure, the statement of Dr. Saunders, the arguments presented to the Patent Office by Heiss' two successive patent attorneys, the patent specification itself and Heiss' corresponding patents in Great Britain and Australia, all show that Heiss regarded the plasticizer to be an indispensable component of the invention. Failure to include a plasticizer in the claims renders them invalid.

In *Wilcox Mfg. Co. v. Eastern Gas & Fuel Associates*, 400 F.2d 960 (4 Cir. 1968), cert. denied, 393 U.S. 1051 (1969) the Court found that a patent directed to a coal mining machine disclosed three salient characteristics—rotation, reciprocation and vertical adjustability. Noting the applicant's statements in the file history, the Court stated (pp. 962-963):

" . . . The inventive concept constantly pressed by Wilcox upon the Patent Office was the 'combining [of] these three movements in a single cutter'. The forgetive and 'vital element' asserted by Wilcox, as the District Judge found, was reciprocation.

* * *

"In an amendment of the application as late as November 3, 1961, Wilcox again alludes to the indispensability of reciprocation, again claiming the triune of the three features as constituting invention:"

The Fourth Circuit then held the claims invalid, stating:

"But then Wilcox omits reciprocation from its patent claims, although disclosing it in its specifications. . . . Consideration of this element is thus precluded, for the deficiency violates the statutory demand for a clear and exact description of the invention. 35 U.S.C. § 112.

* * *

" . . . the patent is void because the claims lack support in the specifications. As already explained, the specifications describe a machine embracing reciprocation, and the file wrapper conclusively reveals that it was the predominant predicate of the Wilcox application. The company cannot now successfully prosecute claims omitting that element."

As heretofore shown, the plasticizer was the predominant predicate of the Heiss invention. Its omission from the Heiss claims is a deficiency rendering them invalid.

In *U.S. Industrial Chem., Inc. v. Carbide & Carbon Chem. Corp.*, 315 U.S. 668, 677 (1942) claims of a reissue patent were involved but the legal principle remains the same. There, the original invention was for a process for producing ethylene oxide wherein water was one of the ingredients originally regarded by the applicant as essential. The Court held that the reissue patent was invalid because of the patentee's omission of water from the claims.

Omitting the plasticizer from the claims materially altered the subject matter of the Heiss invention. The change is so drastic, that it represents an invention entirely different from that which was originally conceived by Heiss and presented to the Patent Office.

The Heiss claims are invalid under 35 U.S.C. § 112 because they fail to point out and distinctly claim the plasticizer, a component which Heiss regarded as essential to his invention.

POINT VI

General is entitled to an award of attorneys' fees.

Title 35 U.S.C. § 285 provides:

"Attorney fees:

The court in exceptional cases may award reasonable attorney fees to the prevailing party."

It is respectfully submitted that the following demonstrates that this is an exceptional case warranting an award of attorneys' fees to General.

1. Heiss never made the invention which is now claimed. His invention was directed to a process for the solidification of a fluid (See Point V). Dropping the plasticizer years after the application was filed was an afterthought. It materially altered the substance of the invention and was an act that was tantamount to practicing a deception on the Patent Office and on the public. See *Railway Co. v. Sayles*, 97 U.S. 554 (1878), where the Court stated (pp. 563-564):

"... Courts should regard with jealousy and disfavor any attempts to enlarge the scope of an application once filed, or of a patent once granted, the effect of which would be to enable the patentee to appropriate other inventions made prior to such alteration, or to appropriate that which has, in the mean time, gone into public use."

2. Heiss copied the invention from the Price patent. It was the issuance of the Price patent that caused Heiss or his attorneys to recognize the significance of use of propylene oxide. Thus, the Heiss claims came about because of knowledge acquired from the Price patent, not any independent invention on the part of Heiss (See Point IV C).

3. The argument of Heiss' patent attorney to overcome the prior art Windemuth patent was consciously misleading. In distinguishing Windemuth, he represented to the Patent Office (PX 2, 665a):

"Windemuth et al. discloses *only* ethylene oxide."
(emphasis added)

The proof in this case is overwhelming that Windemuth's disclosure of "alkylene oxides" is necessarily a disclosure of ethylene oxide and propylene oxide (See Points II and

III herein). In fact, Heiss' attorney himself admitted at the trial that he knew at the time he made the quoted representation to the Patent Office that alkylene oxide embraced propylene oxide (355a-356a). This mischaracterization of Windemuth thwarted fair and adequate consideration by the Patent Office. After ten years of prosecution, the "antlike persistency" of the patent attorney prevailed. *Lyon v. Boh*, 1 F.2d 48, 50 (S.D.N.Y. 1924).

It is respectfully submitted that this is an exceptional case justifying an award of attorneys' fees. *Shingle Product Patents, Inc. v. Gleason*, 211 F.2d 437, 441 (9 Cir. 1954).

CONCLUSION

For the reasons set forth, the judgment of the District Court should be reversed and judgment entered in favor of General.

Dated: New York, New York
February 15, 1974.

Respectfully submitted,

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BACKGROUND CHEMISTRY

The Heiss patent is directed to polyurethane polymers. Polyurethanes result from the reaction of

- (1) a polyol, and
- (2) a diisocyanate.

There are two broad categories of polyurethanes:

- (a) polyester polyurethanes, and
- (b) polyether polyurethanes

both of which are disclosed in the Heiss patent. The Heiss claims, however, are limited to polyether polyurethanes.

The basic concepts, from the testimony of Dr. Herman F. Mark (46a-65a, 115a-121a), are summarized here.

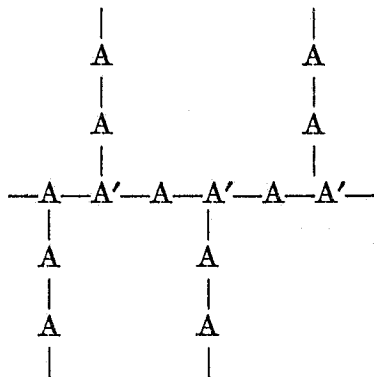
1. *Polymers*

A polymer (poly = many, meros = part) is a molecule comprising a series of single units called *monomers*. The process by which polymers are formed is known as polymerization. Polymers may be *linear*, *branched* or *cross-linked*.

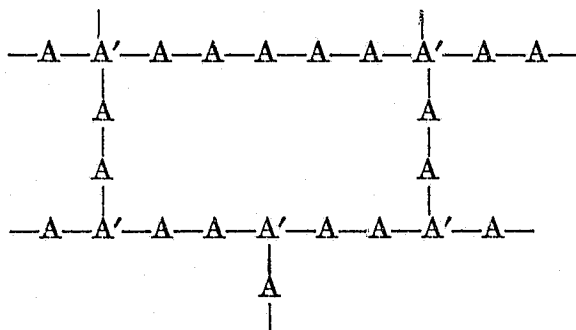
A linear polymer is similar to a chain built up from links, each "link" being a monomer. For example, if —A— represents a monomer, a *linear* polymer may be represented as



A *branched* polymer may be illustrated as



A *cross-linked* polymer may be illustrated as



Generally, the more highly cross-linked a urethane polymer is, the more rigid it becomes.

2. *Reactive or Functional Groups*

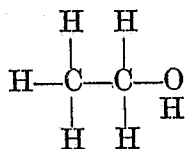
As in a chain of links, monomers may combine with each other to form a polymer only when the monomer has means or the structure for linking up with another monomer. That is, chemically, the monomer must have, at a terminal point of its structure, a *reactive* or *functional* group that is capable of reacting with a functional group of another monomer to form a chemical link or bond.

If a monomer has only one functional group, it is monofunctional and each such monomer is capable of linking up with only one other monomer. When a monomer has two reactive groups it is called *difunctional*; its polymerization leads to a *linear* chain. If one or both starting monomers contain three or more reactive groups, the resulting polymer will be *non-linear*, and have a branched or cross-linked structure.

In the diagrams the A' indicates a trifunctional monomer since its structure contains three reactive groups or arms capable of linking up to form a branched or cross-linked polymer.

3. Alcohols and Polyols

The suffix "ol" indicates that a compound belongs to the class of *alcohols*. All alcohols are characterized by having at least one reactive group in the molecule and it is known as an *hydroxyl* group, represented by OH. The most common member of this class is ethyl alcohol or commercial alcohol. It has the formula C_2H_5OH and can be represented structurally as:



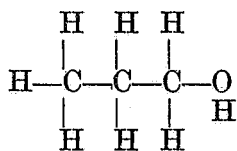
or $R-OH$

where R is C_2H_5

Ethyl Alcohol

The C_2H_5 part of the molecule is sometimes referred to as the backbone of the molecule and is known as the *ethyl* radical; the OH part is called *hydroxyl* group and is the reactive or functional part of this molecule. In writing the formula for an alcohol the OH part is separated to indicate that it is a reactive group and that the molecule is capable of reacting, or linking up with another molecule which has a reactive group. Because it has only one hydroxyl group, ethyl alcohol is monofunctional.

The next member of the alcohol family is propyl alcohol, C_3H_7OH or structurally



or $R-OH$

where R is C_3H_7

Propyl Alcohol

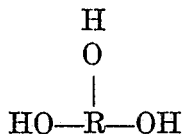
The C_3H_7 part represents the backbone of this molecule and is known as the *propyl* radical. Propyl alcohol is also monofunctional.

It can be seen that propyl alcohol and ethyl alcohol are closely related in their structure; they both contain an unreactive backbone or skeleton which consists only of carbon and hydrogen atoms and they both contain the same functional OH group. Propyl alcohol has just one CH_2 group more than ethyl alcohol and is therefore a *homolog* of ethyl alcohol (57a).

Alcohols which have two hydroxyl groups are called *glycols* or diols. The simplest representative is ethylene glycol, $C_2H_4(OH)_2$ or $HO-R-OH$ where R is C_2H_4 . Here the backbone C_2H_4 is known as the *ethylene* radical. Ethylene glycol is difunctional because it has two hydroxyl groups.

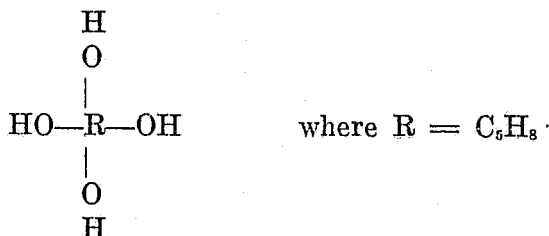
The next adjacent homolog of ethylene glycol is propylene glycol, $C_3H_6(OH)_2$ or $HO-R-OH$ where R is C_3H_6 . It has the propylene radical C_3H_6 as skeleton and two OH groups.

Alcohols which have three hydroxyl groups are *triols*. Glycerine (or glycerol) is one of the more common and may be illustrated as



where $R = C_3H_6$

Alcohols which have four hydroxyl groups are *tetrols*. One of the more important is pentaerythritol which may be illustrated as



Because diols, triols and tetrols contain more than one OH group, they are also called *polyols*.

4. Alkylene Oxides

Ethylene oxide has the formula $\text{C}_2\text{H}_4\text{O}$. It has an ethylene radical or backbone (C_2H_4) and an oxygen atom.

Propylene oxide is the next higher homolog of ethylene oxide (differing by only CH_2) and has the formula $\text{C}_3\text{H}_6\text{O}$.

These compounds are the first and second members respectively of a well-known class of compounds called alkylene oxides (or alkene oxides).

5. Polyethers

When an alkylene oxide is reacted with an alcohol, the compound that is formed is called an *ether*.

If the alcohol has more than one hydroxyl group (i.e., diol, triol or tetrol) the resultant ether, formed by reaction with alkylene oxides, is a polyether polyol (also known as polyalkylene ether polyol). The characteristic of a polyether polyol is that it has an ether backbone and two or more hydroxyl groups.

Thus, when an alkylene oxide, such as ethylene oxide or propylene oxide is reacted with a glycol (i.e., diol) such as ethylene glycol, the result is a polyether polyol having two hydroxyl groups.

When an alkylene oxide, e.g., ethylene oxide, is reacted with a triol, e.g., glycerol, the product is a polyether polyol having an ethylene ether backbone and three OH groups. If the alkylene oxide is propylene oxide, the product is a polyether polyol having a propylene ether backbone and three OH groups. The reaction product may be called a "condensate", an "adduct" or a product made by "chemical addition". These terms are interchangeable.

Polyether polyols inherently have OH groups which are available for further reaction with reactive groups of other compounds.

6. Polyesters

While an *ether* results from a reaction of an alcohol and an alkylene oxide, the result of a reaction of an alcohol and an organic acid is an *ester*. The characteristic of a polyester polyol is that it has an ester backbone and two or more reactive hydroxyl groups. The ability of the polyester polyol to enter into further reactions is governed by the same criteria as for the polyether polyols—namely, the presence of hydroxyl groups on the molecule.

7. Isocyanates

An *isocyanate* is an organic compound which contains an NCO group (nitrogen, carbon and oxygen) in its molecule. A *diisocyanate* is a compound containing only two isocyanate groups. A compound with two or more NCO groups is a *polyisocyanate*. The polyisocyanate referred to most frequently in this case is tolylene (also spelled "toluylene") diisocyanate, abbreviated TDI. The NCO of the isocyanate is a reactive or functional group capable of reacting with the hydroxyl groups of a polyol.

8. Polyurethanes

When the reactive portion of the isocyanate (NCO) reacts with the reactive portion of a polyol (OH), the result is a urethane and the linkage of the two molecules is called a urethane linkage. Hereinafter, we refer

to the urethane linkage as "U"; R in the diagrams represents the radicals of the backbones of the two components.

When a diisocyanate, illustrated as $\text{OCN}-\text{R}_1-\text{NCO}$, is reacted with a diol, illustrated as $\text{HO}-\text{R}_2-\text{OH}$, a *linear polymer* is produced. First an individual OH group reacts with an individual NCO group to form an intermediate compound having a U linkage and terminal NCO and OH groups



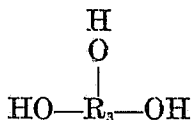
where R_1 is the backbone of the diisocyanate and R_2 is the backbone of the diol (either polyester or polyether).

The terminal NCO and OH groups of the molecule further react with the terminal NCO and OH groups of other molecules to form a linear chain of urethane linkages.

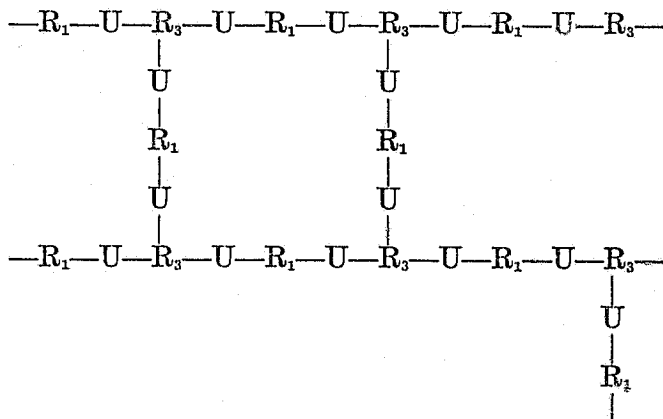


linear polyurethane

When a *triole*



is reacted with a diisocyanate, cross-linked or network polymer structure is produced.



Polyurethane network

R_1 and R_3 may be any organic backbone of the diisocyanate and the triol respectively. To form the polyurethane network, as shown above, the total number of NCO groups must at least equal the total number of OH groups. To insure the presence of enough NCO groups for the complete reaction, an excess of isocyanate is usually added.

Generally, the nature of the reaction between NCO and OH groups is not influenced by the composition of the skeleton or backbone of the diol or the triol or the type of polyisocyanate which may be used. Of course, different backbones produce products having different properties. But regardless of whether the polyol is a polyester or polyether, the essentials of the reaction remain the same—urethane linkages are formed if there are NCO and OH groups available to react. Diols generally produce linear chains; triols and tetrols produce cross-linked systems.

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